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ABSTRACT

Teachers trained in the art of teaching have recognized for many years that the student is an object of instruction. It has only been recently recognized, however, that the student can effectively teach his peers. By doing the teaching, students learn the material better and retain the subject matter longer than they ordinarily would. In addition, students approach the subject matter with enthusiasm and they continue to do so after the course. Fred Keller has developed an instructional technique known as the personalized system of instruction (PSI) in which the use of students as teachers has been maximized. The proctor is not only an important source for disseminating information to other students as a "teacher," but is an important source of feedback on the good and bad characteristics of the program. Proctors have been enthusiastic in their support of the system and harsh in their criticism. (Author)

THE STUDENT AS A TEACHER

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"THE PERSONALIZED SYSTEM OF INSTRUCTION AS VIEWED BY STUDENTS"

A Symposium

K. Anthony Edwards
Chairman

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Abstract

Teachers trained in the art of teaching have recognized for many years that the student is an object of instruction. It has only been recently recognized, however, that the student can effectively teach his peers. By doing the teaching, students learn the material better and retain the subject matter longer than he ordinarily would. In addition, students approach the subject matter with enthusiasm and they continue to do so in future terms. Fred Keller has developed an instructional technique known as the Personalized System of Instruction (PSI) in which the use of students as teachers has been maximized. The proctor is not only an important source for disseminating information to other students as a "teacher" but the proctor is also an important source for feedback on the good and bad characteristics of the program. Proctors have been enthusiastic in their support of the system and harsh in their criticism. The present paper includes some of the literature involving proctors, proctor's views of PSI, and the role of proctors in a beginning psychology course at Utah State University.

Students can teach effectively and they can learn from their teaching. A recent book entitled Students Without Teachers: The Crisis in the University (1969) by Dr. Harold Taylor implies that students are faced with an inadequate supply of teachers. The last chapter in Taylor's book emphasizes that students can serve as teachers. In agreement with Dr. Taylor, the premise of the present paper is that students are well supplied with teachers (themselves). As teachers they can learn more readily and better than as students. It has been adequately shown that students are capable of self-instruction, if given the tools with which to do so (Skinner, 1968). Perhaps it is time now to pass into a new era in which self-instruction is supplemented with social instruction.

The purpose of this paper is to point out that students can teach effectively and that as teachers they tend to learn more and retain it longer than they would simply as learners.

The Student

The student as a student

As a student, students have undergone various metaphors which have attempted to "explain" learning. As Skinner (1968) pointed out, three of these are maturation, acquisition, and construction. The first is that of growth or maturation. This maturation metaphor somewhat hinders the teacher by its own constraints; i.e., the teacher cannot change the child, hence, the teacher is not held responsible for "errors" in learning. Acquisition is also restrictive since only the environmental variables are accounted for; i.e., the student is presented with a flourish of stimuli and if these are not "grasped" the student cannot learn. Neither metaphor tells the teacher what to do or allows him to

see what he has done. Construction may be a preferred metaphor since it accounts for both environment and genetics. The student's skills are built in through shaping processes.

A serious analysis of the interchange between organisms and their environment can be undertaken by an account of three variables (Skinner, 1968): antecedents or environmental events, the response, and the immediate consequences of the response. Contingencies have been thoroughly investigated with many forms of animals including humans under several experimental rubrics. Teaching is one of these rubrics undergoing an investigation of contingencies. Teaching, as defined in this paper, is a set of procedures which expedite learning, or, that is, produce behaviors which would not otherwise occur.

The student as his own teacher

As his own teacher, the student was early recognized by William James (1890) to be responsible for his own building of habits. Late writers such as Read (1911) recognized that the classroom teacher was responsible for the occasion upon which habit-building behaviors are emitted and that the consequences of children's responses are important as well for the maintenance of habits.

Fox (1962) proposed a program under which students could develop good study habits. Three behavioral steps were suggested: environmental stimulus control, small steps toward the final behavior, and reinforced study sessions. Students were instructed to find a study area free from distractions. Students initially performed to study only one or two pages each day, to add only one or two pages of study each day, and to reinforce each session with some activity such as conversation with friends. Results showed considerable success and several studies have followed.

Edwards and Powers (1971) similarly attempted to teach principles of self-management by requiring a lab project dealing with self-behaviors. Students selected some behavior he wished to change, he then recorded baseline data for a brief period, and during the last six weeks an attempt was made to modify the behavior using reinforcement. Procedures are now being refined but essentially remain the same. Our first attempts seemed to produce an interest in self-management procedures.

The student as a teacher of others

Morgan and Toy (1970) have studied the effects of tutoring on learning by the students and the tutors. Thirty-two students were selected by teachers from grades two through five. Half were placed in a control group. Twenty-six students in grades eight through twelve volunteered to tutor. Half were placed in a control group. Control groups received no tutoring nor gave any tutoring. Tutors assigned to the experimental group spent 3 to 4 hours each week in the student's classroom behind a screen. Those tutors were told to be warm, friendly, and accepting in dealing with their pupils. They were to consult with the regular teacher to determine specific content areas which needed work. All subjects were tested before and after the four month tutoring including controls. Results showed that both the tutored student and their tutors gained greatly over their non-tutored controls. This increase ranged from 3 to 5 months better for the tutored and 5 to 9 months better for the tutors. Amazingly, the tutors benefited more from the tutoring than the tutored.

The use of study habits, self-managed behaviors, and tutoring are obviously useful adjuncts to classroom assignments for the teacher has little control of events outside the classroom. Thus, techniques combining the three would be

valuable. Perhaps a discussion of contingency management techniques might provide a lead as to how this can be accomplished.

Contingency Management

Contingency management described

Keller (1971) has summarized his technique of "personalized system of instruction" (PSI). Of primary interest in the present paper is his use of proctors but PSI is characterized by: (1) student self-paced learning, (2) unit perfection, (3) non-required lectures, (4) emphasis on oral and written instruction, and (5) the use of proctors. Proctors (i.e., managers) are used to fill the gap between the students and the instructor. He can fill this gap because he has more capabilities than the student. He is closer to the instructor but he has not yet reached "ivory tower" status. Keller has argued that the proctor is not a teacher or a coach; he does not give lectures or drill students. I do not find the term teacher objectionable, however; with the involvement with students, the manager provides the reinforcers for learning for which the "formal teacher" is held accountable in the form of points on tests. Essentially, he assists the student in preparing for a test of his knowledge, thus meeting the course criteria. The manager has experienced similar coursework in which he was successful or he is asked to volunteer from the class and put in extra effort, he attends weekly meetings where questions are cleared up, and he suggests revisions in the course perhaps arguing in favor of or against the revisions. The manager receives encouragement and recognition from the instructor and other managers; mostly, though, managers are rewarded by a close association with many fellow students. More details of proctor duties will be outlined below.

Contingency management leads to learning

McMichael and Corey (1969) studied the effectiveness of contingency management in terms of learning using a standard text. The text was divided into 12-20 page units. Control classes met 3 times each week and were tested 3 or 4 times during the semester. Experimental students were assigned two 50 minute proctoring sessions each week to take unit tests and receive proctor help. Students were required to pass each unit test of 10 fill-in questions perfectly in order to proceed to the next unit. A film, lecture, or demonstration was given once each week. At the end of the semester, each group was given a 50 question multiple choice test. These questions had been on previous tests for the control group but the experimental students had not seen them. A rating form was included with the final exam. The experimental group showed highest final exam scores and rated the course highest. Corey and McMichael (1970) additionally noted that by comparison retention was greater in the PSI program than in traditional control classes.

Tutoring

Can anyone tutor?

Brown, Fenrick, and Klemme (1971) used "trainable" level retarded students to tutor each other. Students were teenaged with IQ's of around 35 to 50. One set of 30 words was sorted into 3 groups of 10 words each. First, the teacher taught one group of words to one of a pair of children, then she taught a second group of words to the other child. The third group of words were taught to both. By the end of twenty-three 25 minute sessions, the two girls could verbally identify (read aloud) two groups of 10 words. Each girl now knew 10 words that the other did not know and both had observed a model teacher in groups

and individually. The next set of procedures involved everything but the actual teaching of the correct word. The procedures were slowly faded during the next 16 sessions. After 15 additional sessions, both girls knew the 10 words they had not known initially. Finally, the girls used the same teaching procedures to teach their classmates five of the words they had learned. Initially, none of five students correctly identified the five words. In ten 15 minute sessions, the two girls brought the group of five students to a criterion of 23 out of 25 correct responses. To summarize, by this point, two students had learned 20 words each, had taught each other 10 additional words, had taught five other students 5 words each, and four students could now conduct review sessions with their classmates. In addition, the program had extended into the home of the children in that they were able to demonstrate their newly acquired abilities to their families.

Ludwig, Marx, and Hill (1971) have reported the training of chronic schizophrenics. Using operant conditioning procedures, daily behavior therapy sessions were conducted where the patient-therapist with two staff members administered social (praise) and primary (candy, etc) reinforcement for specified approximations to desired terminal behaviors. Each session was divided into three-minute blocks with patient-therapists alternating working with their charge. As patient-therapists worked, they were praised, encouraged, and further instructed by the staff. Coupons were paid for effort and performance with which patient-therapists could redeem for back-up reinforcers. Many of the patient-therapists were reported to obtain competence comparable with staff and some took over some of the staff functions such as time-keeping, recording data, and selecting reinforcers prior to the session. Nearly all patient-therapists were reported to show gains in their own approximations to the final performances.

Apparently a broad range of individuals can effectively tutor others of the same class with appropriate contingencies arranged.

Proctors in PSI

Proctors are an important characteristic of the personalized system of instruction (PSI). Proctors, however, seem to have been largely neglected in studies of PSI. There is at least one exception, though. J. Gilmour Sherman (1970, 1971) has mentioned some problems he had faced in organizing proctors. First, it is too time-consuming for the professor to proctor since he needs to be involved continuously with course construction. Second, graduate students are too anxious to lecture rather than listen; indeed, graduate students in his classes were overheard to fabricate answers which may have been ingenious but were wrong.

If money is available, it serves as a satisfactory reinforcer for proctors. Credits work well also if the administration consents. Sherman was unable to obtain money or credit and finally resorted to using students from his own class. The first ten students to pass unit one on the first try were advanced to a proctor position; they were then responsible for grading, guiding, and interviewing other students and were given a proctor's manual to assist them. The students who missed out as proctors on unit one could become proctors by taking unit two before the incumbents. Thus all students essentially had a chance to proctor. Advantages to this technique are obvious: money is not needed, credits are not necessary, proctors are freshly acquainted with the material, procrastination is not a problem, and students are willing to say they don't know an asnwer. One disadvantage is that the instructor is required to maintain direct tutorial involvement. Sherman says this keeps him from being bored but,

even without directly interviewing students, I find myself hard pressed to get bored even though I keep trying. Sherman stressed that all proctors obtained maximum scores; 33% of his class were proctors. Proctoring appears to require a set of responses different from simply being a student. Apparently the student as a proctor (teacher) is under the control of some "natural" reinforcers as well as some "arbitrary" reinforcers; the student is possibly more often under the control of "arbitrary" reinforcers.

How do managers report their feelings about managing?

In the Fall term of the past year (1971-1972) we started with 11 former managers or students and about 400 enrollment. Since we have noted in the past that one cannot function to well with less than about one manager to ten students, we elected to follow Sherman's (1970) advice and draw students from the class. Our procedures were somewhat different, however. What we chose to do instead was to ask for sophomores, juniors, or seniors who were interested in assisting us to meet and discuss the requirements. After the class was dismissed, the students were asked to make their decision, sign up with us, and register for two hours additional credit. On the next day the new managers were assigned students in a somewhat random fashion by a show of hands. All in all, 23 students were used from the class totaling 34 managers. Although none were declared psychology majors, of the 23, 11 elected to continue in the next term. Four continued from the original 11, one had been a student in the fall term but not a manager, 6 were concurrently enrolled in an experimental analysis of behavior class which is similarly conducted but those students had no prior association with our class, and 11 students volunteered from the winter term to serve as managers (see Table 1).

Insert Table 1 about here

During the Fall term, we undertook to look at the attitude reports of our managers. In terms of a 10-point scale, 33% of the 15 managers surveyed who had volunteered from the class shifted from a low (less than 50%) likelihood that they would become psychology majors to a high (greater than 50%) likelihood. Out of 15 managers surveyed who were concurrently enrolled in the class, only one responded negatively toward changing his major. Of all managers who were concurrently enrolled in the class, all received A's in the class. This is not too surprising since out of all of the students who completed the course, 86% received A's. The major difference is that 42% of the total enrollment withdrew from the class while no managers did. As a function of their position, managers were required to proceed at a more rapid rate than other students; this added to the "pressure", but still did not keep managers from continuing through the course.

Figure 1 shows the means of manager ranking of several questions on a scale from one to ten, low to high, "A" represents the likelihood of psychology as a major during the first week of classes and the last week of classes. Although we did not produce a clamoring for a new major, the mean likelihood nearly doubled. "B" shows the mean ranking of the interest produced by this class as compared with other classes, while "C" shows how the class compared with others in terms of imparting useful information. Although there is no prior date upon which to make comparison, the rank of about 90% in both interest and information indicates that one of our major goals was achieved. "D" shows the likelihood that the manager will return as a manager at some future time for college credit

In actual fact, 14 of the 23 volunteers did return in the winter term (61%) to work as managers. In view of the fact that none had previously stated a major or minor in psychology, this return was impressive. "E" indicates the likehihood that the students will use the same procedures to teach their classes if they are teachers. This is also an impressive figure. A ranking of over 90% indicated that they were pleased with the teaching system by indicating that they would use it themselves.

Insert Figure 1 about here

Managers were required to submit a course critique as a part of their course work. In general, the critiques were favorable, but some valuable negative comments were made. As a result of these comments and discussions with the managers, several beneficial features have been added to the course. These are treated more fully in papers by Goodall (1972) and Sides and Edwards (1972).

Summary and Conclusions

The student learns a set of behaviors which, without being taught, he would not likely have learned. These behaviors are accounted for by doing, experiencing, and being rewarded for correctly doing what is to be learned. The student may be directly responsible for his own learning (since teachers exert little control out of the classroom) but, it is up to the teacher to set the occasion for the student to learn. A system of contingency management in classrooms has been designed in which the student receives maximal individual attention from his peers and he learns in small steps much more than simply how to take "objective" tests. Within the system, it is necessary to use students to teach students. Evidence indicates that tutors, as a function of tutoring, learn more than students who

do not tutor; teaching is thus indicated as a learning device. In addition, it has become apparent that a wide range of individuals can tutor others.

In our classes, managers have favorably responded to their jobs by: (1) indicating a likelihood that they will change their majors to psychology, (2) indicating that they are likely to use similar techniques to teach their own students, and (3) returning to work as managers in later terms even though they did not always change majors. Our course is involved in training specialists in testing, oral interviewing, conducting self-management projects and topic discussion groups, and assisting the instructor in developing policies and procedures. The techniques used seem to be the most efficient means of developing highly personalized procedures for teaching. Students are proving to be effective, efficient, and humanistic teachers of behavioral fundamentals in our classes. Further, what is stopping the technique from advancing students in other disciplines? Nothing, since many disciplines are incorporating PSI (see McMichael, 1971). The lack of instant change is the only irritating aspect at present.

References

Brown, L., Fenrick, N., and Klemme, H. Trainable pupils learn to teach each other. Teaching Exceptional Children, 1971, 4, 18-24.

Cooper, J. L., and Greiner, J. M. Contingency management in an introductory psychology course produces better retention. The Psychological Record, 1971, 21, 391-400.

Corey, J. R., and McMichael, J. S. Using personalized instruction in college courses. Unpublished paper, 1970.

Edwards, K. A., and Powers, R. B. Self-management in a beginning psychology course as a laboratory exercise. Paper presented at an informal paper session of Division 25 at the meeting of the American Psychological Association, Washington, D. C., September, 1971.

Fox, L. Effecting the use of efficient study habits. Journal of Mathetics, 1962, 1, 75-86.

James, W. Principles of psychology. New York: Holt, 1890.

Keller, F. S. A programmed system of instruction. In W. C. Becker (Ed.) An empirical basis for change in education. Chicago: Science Research Associates, 1971, 503-522.

Ludwig, A. M., Marx, A. J., and Hill, P. A. Chronic schizophrenics as behavioral engineers. Journal of Nervous and Mental Disorders, 1971, 151, 31-44. (Reported in Psychiatry Digest, August 1971, p. 51.)

McMichael, J. S. (Chairman) Personalized instruction: a symposium in honor or Fred Keller. Symposium at the meeting of the American Psychological Association, Washington, D. C., September, 1971.

McMichael, J. S., and Corey, J. R. Contingency management in an introductory psychology course produces better learning. Journal of Applied Behavior Analysis, 1969, 79-83.

Morgan, R. F., and Toy, T. B. Learning by teaching: a student-to-student compensatory tutoring program in a rural school system and its relevance to the educational cooperative. The Psychological Record, 1970, 20, 159-169.

Read, M. S. An introductory psychology: with some educational applications. New York: Ginn and Company, 1911.

Sherman, J. G. PSI, a historical perspective. Paper presented at the meeting of the Rocky Mountain Psychological Association, Denver, May, 1970.

Sherman, J. G. Some permutations on an innovation. Paper presented at the meeting of the American Psychological Association, Washington, D. C., September, 1971.

Skinner, B. F. The technology of teaching. New York: Appleton-Century-Crofts, 1968.

Taylor, H. Students without teachers: the crisis in the university. New York: McGraw-Hill, 1969.

Table 1. PSI managers, 1971-1972

	N	Enrolled in EAB Class	Experienced as volunteer manager in prior term	Non-credit managers*	Volunteers from class	Experienced in terms prior to last term	Past student but never manager
Fall	34	-	11	-	23	-	-
Winter	33	6	11	1	11	4	1
Spring	27	-	8	1	--	8	11

*Not counted in total N.

Figure Caption

1. Mean rank of Likert-type questionnaires on scale from 1 to 10, low to high by managers in a PSI introductory psychology class. "A" represents ranking of the likelihood of a major in psychology before and after the course. "B" represents interest compared with other classes taken. "C" represents useful information in comparison with other classes. "D" represents the likelihood of returning as a manager. "E" represents the likelihood of using the same procedures in classes of their own.

RANK ($\bar{X}$)
0
2
4
6
8
10
N=15
N=15
N=15
N=15
N=16
N=16
PRE POST
A
B
C
D
E